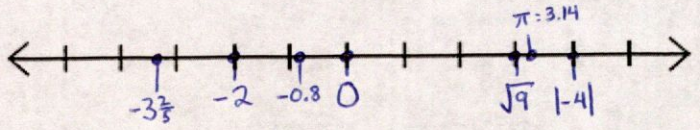
Algebra Post-Assessment

Name SOLUTIONS

Graph and label each of these numbers on the number line provided:

$\left\{0,\ -2,\ \frac{3}{4},\ -0.8,\ |-4|,\ \sqrt{9},\ -3\frac{2}{5},\ \pi\right\}$




Perform the following operations, simplifying where necessary:

$7-(-10)=$

$7+10=$ **17**

$-5\cdot 20=$ **−100**

$2^5=$

$2\cdot 2\cdot 2\cdot 2\cdot 2$

$8\cdot 4=$ **32**

$6\sqrt{2}\cdot\sqrt{2}=$

$6\cdot\left[2^{1/2}\cdot 2^{1/2}\right]$

$6\cdot\left[2^{1/2+1/2}\right]=6\cdot[2^1]=$ **12**

$\frac{1}{3}+\frac{7}{8}=$

3·8 = 24 (×8, ×3)

$\frac{8}{24}+\frac{21}{24}=$ **$\frac{29}{24}$ or $1\frac{5}{24}$**

$\frac{6}{5}\cdot\frac{3}{8}=\frac{6\cdot 3}{5\cdot 8}=\frac{18}{40}=$ **$\frac{9}{20}$**

$\frac{9.6\times10^4}{3.2\times10^{-2}}=$

$\left(\frac{9.6}{3.2}\right)\times\left(\frac{10^4}{10^{-2}}\right)=(3)\times\left(10^{4-(-2)}\right)=$ **$3\times10^6$ or 3,000,000**

$\frac{0}{12}=$ **0**

$-2[5(6\div 3)+8-4^2]=$

$-2[5(2)+8-16]$

$-2[10+8-16]=-2[2]=$ **−4**

$(3n-1)^2=$

$(3n-1)(3n-1)=3n(3n-1)-1(3n-1)$

$=9n^2-3n-3n+1=$ **$9n^2-6n+1$**

What is the greatest common factor of the numbers 20 and 48?

20: 1·20, 2·10, (4)·5

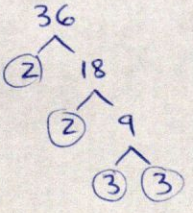
48: 1·48, 2·24, 3·16, (4)·12, 6·8

a. 2
b. 3
c. 4
d. 6
e. none of the above

Which of the following numbers is *not* prime?

a. 17 – prime
b. 41 – prime
c. 71 – prime
d. 77 — 7·11
e. none of the above

What is the correct prime factorization of 36?




a. 3·6
b. 6·6
c. 2·2·3·3
d. 2·3·4·6·9·12·18
e. none of the above

Factor this quadratic function into two binomials, then find the two x-intercepts and one y-intercept.

$f(x)=x^2+6x-16$

+ − or − +

16: 1·16, 2·8, 4·4

$(x-2)(x+8)$

When $y=f(x)=0$:

$0=x-2$, $x=2$ → (2, 0)

$0=x+8$, $x=-8$ → (−8, 0)

When $x=0$:

$y=0^2+6\cdot0-16$

$y=-16$ → (0, −16)

Find the point $(x, y)$ where these two linear equations intersect.

① $5x+2y=8$
② $-2x+y=-5$

solution / intersection **(2, −1)**

SUBSTITUTION

Solve ② for y:

$-2x+y=-5$

③ $y=2x-5$

Substitute ③ into ①:

$5x+2y=8$

$5x+2(2x-5)=8$

$5x+4x-10=8$ (+10, +10)

$\frac{9x}{9}=\frac{18}{9}$

$x=2$

② $-2(2)+y=-5$

$y=-1$

ELIMINATION

$5x+2y=8$

$-2(-2x+y=-5)$

Multiply ② by −2 to eliminate y:

$5x+2y=8$

$+4x-2y=+10$ (combine)

$9x=18$

$x=2$

$5(2)+2y=8$

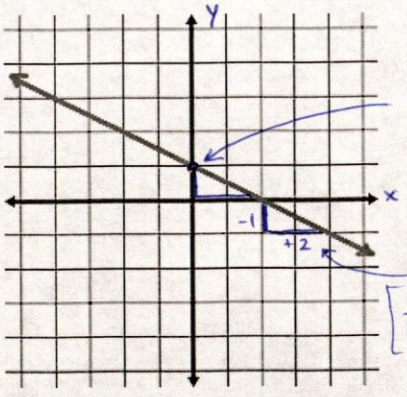
$\frac{2y}{2}=\frac{-2}{2}$

$y=-1$

# Algebra Post-Assessment (page 2)

Write the equation of the graphed line in slope-intercept form.

$y = -\frac{1}{2}x + 1$

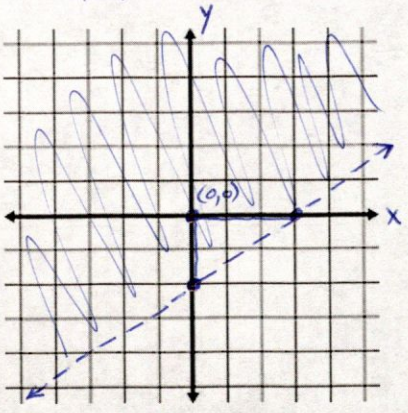



y-intercept at 1

slope = $-\frac{1}{2}$ [vertical change / horizontal change]

Graph this linear inequality: $2x - 3y < 6$
(Remember to indicate all solution points)

↳ any points in shaded area




Evaluate when $x=0$ and $y=0$

$2(0) - 3(0) < 6$

$0 < 6$

true, so (0,0) is a solution

$2x - 3y < 6$

$-2x \quad -2x$

$\frac{-3y}{-3} < \frac{-2x+6}{-3}$

* switches sign

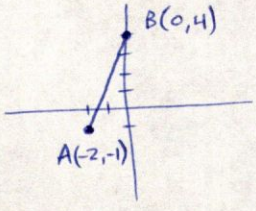
$y > \frac{2}{3}x - 2$

slope: $\frac{2}{3}$

y-intercept: $-2$

$>$ : dotted line

Calculate the slope and the distance of the line between these two points: $A(-2,-1)$ $B(0,4)$




$x_1, y_1$ $x_2, y_2$

$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4-(-1)}{0-(-2)} = \frac{4+1}{0+2} = \boxed{\frac{5}{2}}$

$\text{distance} = \sqrt{(y_2-y_1)^2 + (x_2-x_1)^2} = \sqrt{(4+1)^2 + (0+2)^2} = \sqrt{5^2+2^2}$

$= \sqrt{25+4} = \boxed{\sqrt{29}}$

-- If there was a line perpendicular to this line above, what would be its slope?

↳ opposite reciprocal slope

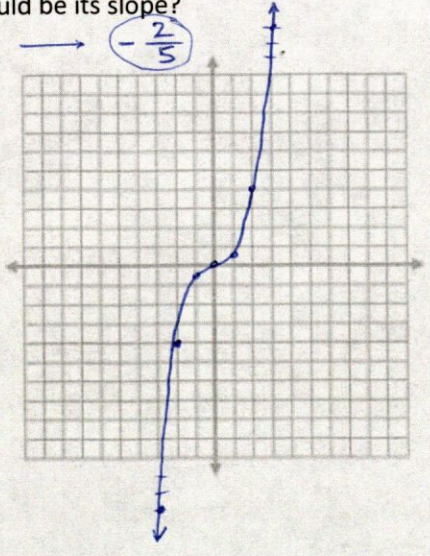
$+\frac{5}{2} \longrightarrow \left(-\frac{2}{5}\right)$

Fill in the table of values and then graph this function: $g(x) = \frac{x^3}{2}$

| $x$ | −3 | −2 | −1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| $g(x)$ | -13.5 | −4 | $-\frac{1}{2}$ | 0 | $\frac{1}{2}$ | 4 | 13.5 |

$\frac{(-3)^3}{2} = \frac{-27}{2} = -13.5$ $\quad \frac{(-1)^3}{2} = -\frac{1}{2}$

$\frac{(-2)^3}{2} = -\frac{8}{2} = -4$ $\quad \frac{(2)^3}{2} = \frac{8}{2} = 4$

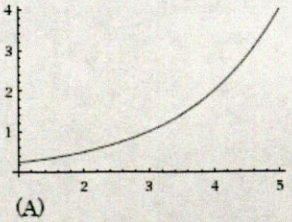


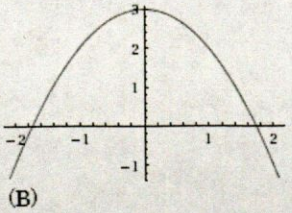
Match each graph to its corresponding function:

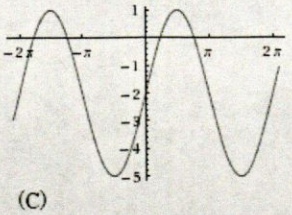
A $f(x) = 2^{(x-3)}$

C $g(x) = 3\sin(x) - 2$

B $h(x) = -x^2 + 3$


(A)


(B)



(C)

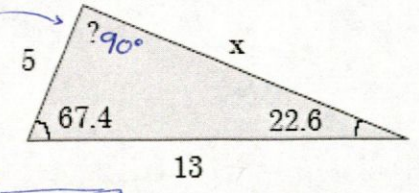
## Algebra Post-Assessment (page 3)

Calculate the unknown angle and side length of this triangle.

All angles add to 180: $180 - 67.4 - 22.6 = ?$

$180 - 90 = ?$

$90 = ?$




Since now we know this is a right triangle, we can use the Pythagorean theorem:

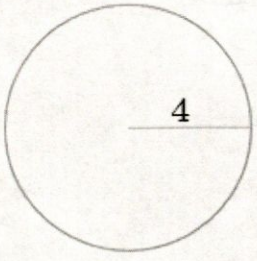
$5^2 + x^2 = 13^2$

$x^2 = 13^2 - 5^2$ → $x^2 = 169 - 25$

$\sqrt{x^2} = \sqrt{144}$

$x = 12$

Calculate the circumference and area of this circle. [ Remember that $\pi \approx 3.14$ or $22/7$ ]




Circumference = $\pi \cdot$ diameter

$= \pi \cdot 2 \cdot$ radius

$= \pi \cdot 2 \cdot 4$

$= \pi \cdot 8$

$3.14 \times 8 = 12.12$

circumference $\approx$ 12.1

Area = $\pi \cdot r^2$

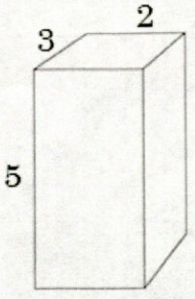
$= \pi (4)^2$

$= \pi \cdot 16$

area $\approx$ 50.2

$3.14 \times 16 = 1884 + 3140 = 50.24$

Calculate the volume and surface area of this rectangular prism.




Volume = length × height × width

$= 2 \times 5 \times 3$

$V =$ 30

Surface Area

$2 \times 5 \times 2 = 20$

$3 \times 5 \times 2 = 30$

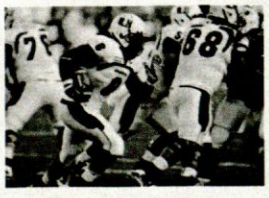
$2 \times 3 \times 2 = 12$

$2(10) + 2(15) + 2(6) = 20 + 30 + 12 =$ 62

Translate the following numerical expression into an English statement (spell all numbers 10 --> "ten"):

$2x^3 + \frac{3}{4}y \geq \sqrt{26}$

"Two x cubed plus three-fourths y is greater than or equal to the square root of twenty-six."



There are several ways to score points in American football.
The most common ways are:
Field goal (3 pts): to kick the ball through the upright posts
Touchdown (7 pts total): to run/pass the ball into the endzone then kick an extra point
(If you are familiar with football, we will ignore 2-point safeties and conversions here.)

Using only point combinations of a field goal (3 points) and a touchdown (7 points),
What is the *highest* point total a football team *cannot* score?
[ex. a team can't score 5 points, but they can score 6 points with two field goals]

| | | can't score |
|---|---|---|
| 3 → | 3 | 1 |
| 3+3 = | 6 | 2 |
| 7 → | 7 | 4 |
| 3+3+3 = | 9 | 5 |
| 7+3 = | 10 | 8 |
| 3+3+3+3 = | 12 | 11 * highest point total a team cannot score under these conditions. |
| 7+3+3 = | 13 | |
| 3+3+3+7 = | 14 | this pattern will continue covering all possible scores |
| 7+7+3 = | 15 | |